

Claims

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1. A method for production of curved thread-reinforced tubular structures composed of rubber layers and of strengthening layers, comprising the steps of:
applying a first rubber layer to a circumference of mandrels driven forward in a feed direction (X);

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winding on a multiplicity of parallel reinforcing threads, having defined thread angles (α) with respect to a feed axis, by means of a bobbin creel, to form a first thread ply, the mandrels being led through a rotating deflection element surrounding the mandrels and guiding the reinforcing threads so as to distributed on the inner circumference;

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applying a covering rubber layer, wherein
the mandrels are led through the deflection element of the bobbin creel eccentrically in the region of the deflection element.

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2. The method as claimed in claim 1, further comprising displacing a guide of the mandrels transversally to the feed direction (X) about a position shifted with respect to a concentric lead through of the mandrels through the deflection element.

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3. The method as claimed in claim 1, further comprising displacing the deflection element, together with the bobbin creel, transversely to the feed direction (X) from a position shifted with respect to a concentric lead through of the mandrels through the deflection element.

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4. The method as claimed in claim 1, wherein the applying the covering of the rubber layer is provided after optionally multiple execution of at least one of the applying a first rubber layer and the winding steps.

5. The method as claimed in claim 1, further comprising cooperating the guide with the mandrels in order to displace the mandrels transversally to the feed direction (X) about a position shifted with respect to a concentric lead through of the mandrels through the deflection element.

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6. A device for the production of curved thread-reinforced tubular structures, comprising:

at least one bobbin creel which has a rotatable deflection element which surrounds mandrels being driven forward in a feed direction (X) and which guides reinforcing threads so as to be distributed on the inner circumference; and

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adjustable guide means for leading the mandrels through the deflection element of the bobbin creel eccentrically in the region of the deflection element.

7. The device as claimed in claim 6, wherein the guide means cooperate with the bobbin creel in order to displace the bobbin creel transversely to the feed direction (X) about a position shifted with respect to the concentric lead through of the mandrels through the deflection element.

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8. The device as claimed in claim 6, wherein an inside diameter of the deflection element is correspondingly larger than a diameter of the mandrel covered with at least one rubber layer.

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9. A method for production of curved thread-reinforced tubular structures, comprising the steps of:

leading at least one mandrel through a deflection element of a bobbin creel in a feed direction, offset from a central longitudinal axis of the deflection element; and

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winding a multiplicity of parallel reinforcing threads on the at least one mandrel as the mandrel is led through the deflection element resulting in defined thread angles (α) with respect to a feed axis to form a tubular structure having a curvature.

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10. The method as claimed in claim 9, further comprising the steps of:
applying a rubber layer to a circumference of at least one mandrel driven
forward in a feed direction (X); and
applying a covering rubber layer to the rubber layer.

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11. The method as claimed in claim 9, wherein the at least one mandrel is led
through the deflection element eccentrically in the region of the deflection element.

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12. The method as claimed in claim 11, wherein the thread angles correspond
directly to a distance of the deflection element from the at least one mandrel so that
when the at least one mandrel is led through the deflection element different thread
angles are produced over a circumference of the at least one mandrel.

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13. The method as claimed in claim 9, wherein the winding on a multiplicity of
parallel reinforcing threads forms a tubular structure which automatically
undergoes a curvature after the multiplicity of parallel reinforcing threads are
drawn off from the at least one mandrel.

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14. The method as claimed in claim 13, further comprising vulcanizing the
multiplicity of parallel reinforcing after it is drawn from the at least one mandrel.

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15. The method as claimed in claim 9, further comprising varying the offset
lead through of the at least one mandrel at selected portions to define curvatures of
a resultant tubular structure.

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16. The method as claimed in claim 15, further comprising varying the lead
through of the at least one mandrel at selected portions to be concentric with the
deflection element.

17. The method as claimed in claim 9, wherein the lead through of the at least
one mandrel through the deflection element is provided by at least one of:

displacing guides of the mandrels transversally to the feed direction about a position shifted with respect to a concentric lead through of the at least one mandrel through the deflection element; and

5 displacing the deflection element, together with the bobbin creel, transversely to the feed direction from a position shifted with respect to the concentric lead through of the at least one mandrel through the deflection element.

18. The method as claimed in claim 9, wherein the at least one mandrel is advanced in a continuous process in a feed direction X through successively
10 arranged extrusion devices.

19. The method as claimed in claim 9, wherein the thread angles are dependent on a feed speed of the at least one mandrel and a gap between an inner circumference of the deflection element and an adjacent outer circumference of the
15 at least one mandrel.

20. The method as claimed in claim 9, wherein:

a smaller gap between the circumferential region at least one mandrel and the deflection element results in thread angles α_1 ;

20 a larger gap between the circumferential region of the at least one mandrel and the deflection element results in thread angles α_2 ; and

a small radius is obtained in a region of the smaller thread angles α_1 and a large radius is obtained in a region of the large thread angles α_2 .